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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,262	02/12/2004	Yuji Enomoto	A8319.0033/P033	4861

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EXAMINER	
NGUYEN, TRAN N	

ART UNIT	PAPER NUMBER
2834	

DATE MAILED: 08/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/776,262	ENOMOTO ET AL.	
	Examiner	Art Unit	
	Tran N. Nguyen	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) 1-9 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

2. **Claim 4** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 is indefinite because of the alternative recitation to change the limitations of an internal rotor and external rotor within the same claim.

The applicant is suggested to re-write claim 4 into two claims with respectively one reciting internal rotor and the other reciting external rotor.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-5, 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott et al (US 4,694,210)** in view of **Takahashi et al (JP 2-211043).**

Elliott discloses a permanent magnet motor for driving an axial flow fan (figs 2-3), comprising:

a rotor (94) (fig 2) including a permanent magnet (116);

a stator (92) including a stator core (126) having a stator winding (124), wherein there is a magnetic attraction force of the permanent magnet and the stator core;

shaft fan (100) arranged on said rotor;

wherein:

the fan (96) is rotated with the rotor,

a thrust assembly (110) is for supporting the thrust load movement for the rotor in a direction of thrust of the rotary shaft rotation said fan; and

bearing (104, 106) for rotatably said rotor;

Elliott substantially discloses the claimed invention, except for the following limitations:

(a) rotary density of the permanent magnet facing the stator core lower at an end portion than at a central portion of the permanent magnet along the direction of thrust of the rotary shaft, wherein a surface magnetic flux permanent magnet motor configured of magnetic materials having different magnetic characteristics so that surface magnetic flux density of said permanent magnet facing said stator core is lower at the end portion than at the central portion of said permanent magnet along the direction of thrust said rotary shaft, as recited in claims 1-2, 5; or

(b) a wider gap, which is formed by chamfered or curved portion, between the permanent magnet (PM) and the stator at the end portion that the central portion in the direction of thrust rotation, as recited in claims 3-4.

Takahashi, however, in one (figs 1, 3) of disclosed embodiments of a PM motor comprising a PM rotor (6) position at a gap with respect to the stator (7) (figs 1, 3) wherein Takashahi teaches that by configuring the stator and the rotor of magnetic materials with different magnetic characteristics so that surface magnetic flux density of the PM facing said stator core is lower at the end portions, by gaps (S), than at the PM central portion, at portion (7-1) of the stator, along the direction of thrust said rotary shaft. Particularly, Takashahi teaches that by forming wider

gaps, which is formed by chamfered portion (fig 3), between the permanent magnet (PM) and the stator wider at the end portion that the central portion in the direction of thrust rotation, rotary density of the permanent magnet facing the stator core lower at an end portion than at a central portion of the permanent magnet along the direction of thrust of the rotary shaft. The Takashahi's configurations in the PM motor would enable to not only reduce core loss but also increase high magnetic flux density in the thrust direction to carry out by strong magnetic attraction.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the disclosed PM motor by configuring the motor with the stator and the rotor of magnetic materials with different magnetic characteristics so that surface magnetic flux density of the PM facing said stator core is lower at the end portions, by wider gaps, than at the PM central portion along the direction of thrust said rotary shaft, as taught by Takashahi. Doing so would enable not only reducing core loss but also increase high magnetic flux density in the thrust direction to carry out by strong magnetic attraction, resulting in reducing vibration.

Regarding the limitations that the PM rotor is an external rotor with chamfered or curved portion at the end portion or an internal rotor with chamfered or curve portion, to lower the flux density end portions thereof, as recited in claim 4.

Those skilled in the art would understand that arranging a rotor to be internal or external rotor with respect to the stator is a matter of obvious engineering design choice based upon the size/shape of the motor. An outer rotor produces larger inertial and angle velocity and facilitates winding process for the stator, while the inner rotor produce less vibration and frictional drag thereof. Furthermore, the importance of Takashahi's teaching is to form the rotor and the stator having different magnetic characteristics at both ends thereof to lower the magnetic flux density for thrust load support as well as to reduce core loss, whether the chamfered portion is formed in

the stator core or in the rotor PM is a matter of obvious engineering design choice which is a reversal positioning the chamfered portion that still yield the same effect.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the disclosed PM motor, as of Elliott and Takashahi, by applying the essential teaching of Takashahi, to form the PM rotor's end with the chamfered portions, instead of the stator's both ends that facing the PM rotor ends; this is a reversal arrangement of the chamfered portions that would still yield the same magnetic effects as taught by Takashahi. Furthermore, it would have been obvious to one skilled in the art at the time the invention was made to modify the disclosed PM motor by reversibly arrange the PM rotor as an internal rotor instead of an external rotor. Doing so would reduce generated vibration of the rotor due to centrifugal force. Also, it has been held that reversibly re-arranging disclosed components requires only routine skill in the art (*In re Japikse, 86 USPQ 70)* since one of ordinary skill in the art would have the necessary mechanical skill to make simple reversals of positions of mechanical parts without an express teaching in a reference (*In re Bozek, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969).*

Regarding claim 7, by the same token as above discussion, the importance of Takashahi's teaching is to form the rotor and the stator having different magnetic characteristics at end portion thereof to lower the magnetic flux density for thrust load support as well as to reduce core loss. As taught by Takashahi this different magnetic characteristic at end portion is formed by a chamfered portion. However, the essential teaching is that by configuring the end portion with different characteristics, in this case it can be done by a chamfered portion or by a different magnetic material employed to end portions of one of the stator and the rotor, in order to serve the same purpose of reducing magnetic flux density at the end portion of the stator or the rotor to support the thrust load so that vibration can be reduced.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the disclosed PM motor, as of Elliott and Takashahi, by applying the essential teaching

of Takashahi to create a low flux density between end portion of the rotor and the stator, by form the PM rotor's end with the magnetic yoke that has lower magnetization than the PM material for the same purpose of creating a low density flux there between the stator and the rotor, as taught by Takashahi. Doing so would be considered as mechanically various application of Takashahi's teaching for the same magnetic flux effects.

4. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott** and **Takashahi,** as applied in the rejection against the base claim, and further in view of **Tanaka et al (US 4,015,154).**

The combination of Elliott and Takashahi refs discloses the claimed invention, except for the added limitations of stator including said stator winding and said stator core is molded with synthetic resin.

Tanaka, however, teaches these features (fig 1) for the purpose of insulating the stator assembly as well as reducing vibration of the motor.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the PM motor by providing the stator with resin molding the entire assembly, as taught by Tanaka. Doing so would enable to insulate the stator from prevent that stator in case the stator come mechanically into contact with the rotor each other as well as to reduce vibration and noise.

Regarding the material to be synthetic resin, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select synthetic resin, which is well known in the art, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin, 125 USPQ 416.*

5. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Elliott** in view of **Daykin et al (US 3,842,300).**

Elliott substantially discloses the claimed invention, except for the following limitations: *a thickness of the stator core in the direction of thrust of the rotary shaft is greater than a thickness*

of the permanent magnet in the direction of thrust of the rotary shaft by an amount substantially equivalent to a displacement of said rotor moved by the thrust with a maximum rotational speed of said fan.

Daykin, however, teaches a PM motor having a stator and a rotor (fig 4) wherein the axial thickness of the stator is configure to be greater than that of the rotor in the direction of thrust of the rotor shaft. Generally and importantly the Daykin's teaching of configuring the stator with greater length that the rotor's length in order to provide an electromagnetically more efficient rotary field generating means. The rotary field generating means of Daykin's motor is capable of generating a comparable magnitude electromagnetic field having *a reduced flux density in the air gap between the rotor and the stator due to the increase in flux gathering area. The reduced flux density permits, for example, low coercive force permanent magnets and high thrust load support.*

Thus, those skilled in the art would understand that by applying the Daykin's essential teaching of forming the stator 's length to be greater than the rotor's length, one would enable to achieve low magnetic density at the end portions between the rotor and the stator.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thickness of the stator in the direction of thrust of the rotary shaft is greater than a thickness of the rotor in the direction of thrust of the rotary shaft, as taught by Daykin. Doing so would enable to achieve low coercive force permanent magnets and high thrust load support.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to figure out the amount of axial thickness of the stator to be greater than that of the rotor so that it is *substantially equivalent to a displacement of said rotor moved by the thrust with a maximum rotational speed of said fan, as recited in the claim,* because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran N. Nguyen whose telephone number is (571) 272-2030. The examiner can normally be reached on M-F 7:00AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571)-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tran N. Nguyen
Primary Examiner
Art Unit 2834